REMARKS

Claims 1-5 are pending in this application. By this Amendment, claims 1-5 are amended and claims 6-10 are canceled without prejudice to or disclaimer of the subject matter recited therein. No new matter is added.

I. Address Change

Applicants respectfully request that all further communications regarding this patent application be forwarded to Oliff & Berridge, PLC, as requested in the Power of Attorney by Assignee and Change of Address, filed concurrently.

II. Allowable Subject Matter

Applicants appreciate the indication of allowable subject matter in claims 4 and 5, they being allowable if rewritten to overcome the rejections under 35 U.S.C. §112, second paragraph and to include all of the features of their base claim and any intervening claims. Applicants assert that claims 4 and 5 are allowable for at least the reasons discussed below.

III. Rejections Under 35 U.S.C. §112

Claims 1-5 are rejected under 35 U.S.C. §112, second paragraph. The rejection is respectfully traversed.

Claim 1 is amended in reply to the rejection. Additionally, Figs. 3A and 3B illustrate the switching operation of the semiconductor element. As shown in Fig. 3B, the "former stage" corresponds to the period between t_5 and t_6 of the transition period before the transistor 8 is fully turned off at t_7. The "latter stage" corresponds to the period between t_6 and t_7, as shown in Fig. 3B.

Regarding claim 2, as discussed above, the "stages" correspond to periods of time, i.e., transition periods. Regarding claim 3, the follower operation is defined in the specification as an operation of a circuit in which the field coil and the fly wheel diode are connected to the source electrode or the emitter electrode (page 5, lines 23-27). Regarding claims 4 and 5,

Applicants assert that claims 4 and 5 particularly point out and distinctly claim the subject matter which Applicants regard as the invention in light of the amendment made to claim 1 and the discussion above. Thus, Applicants respectfully request the rejection of claims 1-5 under 35 U.S.C. §112, second paragraph, be withdrawn.

IV. Claim Rejections Under 35 U.S.C. §103

Claims 1-3 are rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 5,629,606 to Asada in view of U.S. Patent No. 5,610,499 to Rogers. The rejection is respectfully traversed.

Applicants assert that neither Asada nor Rogers, whether considered alone or in combination, disclose or suggest a voltage regulator of a vehicle AC generator including a field coil and a rectifier for rectifying generated AC output, the voltage regulator comprising a semiconductor element connected to the field coil for controlling current supplied to the field coil, the semiconductor element having a variable current switching capacity and a turn-off transition period before it is turned off, ... and a switching capacity control means for controlling the current switching capacity during a former stage of the turn-off transition period of the semiconductor element to be larger than the current switching capacity during the latter stage of the turn-off transition period.

It is admitted in the Office Action that Asada does not disclose that some of the transition periods may be larger than others. To overcome the admitted deficiency, the Office Action combines Rogers and alleges that it would have been obvious to one of ordinary skill in the art at the time the invention was made to design a voltage regulator as disclosed by Asada having "different off transitional periods" for the purpose of reducing fuel consumption and emission in vehicles as disclosed by Rogers.

Applicants submit that Rogers does not overcome the features recited in the amended claims. Rather, Rogers merely discloses that the on-off switching time is modified according

to the ambient temperature. For example, the contact was caused to remain on for a slightly longer period when the ambient temperature was low and to remain off for a slightly longer period when the ambient temperature was high. Thus, the nominal output voltage of the alternator was controlled according to the ambient temperature. (See col. 14, lines 21-27 of Rogers).

Additionally, there is no suggestion in Rogers to make such a combination as Rogers is addressing a problem different from that of the application. The invention of Rogers relates to a three battery system (start battery, run battery, catalytic converter pre-heat battery). Rogers addresses reducing fuel consumption and emission in vehicles, whereas the problem being addressed in the Application is the reduction of electromagnetic noise caused by conductance of a power line that connects a semiconductor element and a battery when the semiconductor element is turned off to cut current supplied to the field coil (see page 1, line 15 - page 2, line 10). Accordingly, Applicants respectfully request the rejection of claims 1-3 under 35 U.S.C. §103(a) be withdrawn.

V. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-5 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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Date: September 15, 2003

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Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A voltage regulator of a vehicle AC generator including a field coil and a rectifier for rectifying generated AC output, said voltage regulator comprising:

a semiconductor element connected to said field coil for controlling current supplied to said field ~~coil;~~coil, said semiconductor element having a variable current switching capacity and a turn-off transition period before it is fully turned off;

a flywheel element connected in parallel with said field coil;

generation voltage regulating means for controlling said semiconductor element to turn on or off so that an output voltage of said rectifier can be regulated to a regulated voltage according to a signal related to said output voltage; and

switching capacity control means for controlling ~~a~~ the current-switching capacity during a former stage of ~~a~~ the turn-off transition period of said semiconductor element to be larger than ~~that~~ the current switching capacity during ~~the~~ a latter stage of the turn-off transition period.

2. (Currently Amended) The voltage regulator of a vehicle AC generator according to claim 1, wherein

said switching capacity control means changes one of control voltage and control current of said semiconductor element at an approximately fixed change rate during said former stage of said turn-off transition period and ~~said~~ the latter stage, and

said change rate at the former stage is set larger than the change rate at the latter stage.

3. (Currently Amended) The voltage regulator of a vehicle AC generator according to claim 2, wherein

said semiconductor element carries out a follower operation.

4. (Currently Amended) The voltage regulator of a vehicle AC generator according to claim 1, further comprising:

a comparator for comparing a signal voltage related to a voltage drop of main electrodes of said semiconductor element with a reference value; and

said switching capacity control means decreases a decrease rate of the current switching capacity of the control electrode of said semiconductor element to a smaller value right after said signal voltage becomes said reference value during said turn-off transition period.

5. (Currently Amended) The voltage regulator of a vehicle AC generator according to claim 4, wherein

said comparator increases charging current of ~~said~~ a gate electrode of said semiconductor element, right after said signal voltage becomes said reference value during the turn-on transition period of said semiconductor element; and

said reference value for changing said charging current during said turn-on transition period is set lower than a predetermined value for changing said charging current during said turn-off transition period.

6-10. (Canceled)